PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicants	:	Gebhart et al.
Serial No.	:	10/804,841
Filed	:	March 19, 2004
Title	:	ELECTROPLATING CELL WITH HYDRODYNAMICS FACILITATING MORE UNIFORM DEPOSITION ACROSS A WORKPIECE DURING PLATING
Docket	:	461987-00024
Art Unit	:	1795

DECLARATION OF HOLLY GARICH UNDER 37 C.F.R. § 1.132

Dear Sir:

I, Holly Garich, declare and state the following:

I am employed as a Project Engineer at Faraday Technology, Inc. of Clayton, Ohio and have worked there for six years. I have a Masters in Chemistry from Wright State University, Dayton, Ohio.

I am familiar with U.S. Patent Application Serial No. 10/804,841 and the Office Action dated April 2, 2008. The application includes claims directed to a method for electrodepositing a metal on a workpiece using an electrolytic cell, as referenced in Figure 11, that includes a workpiece 102 that serves as a cathode, an anode 112 housed in an anode chamber 126 that includes a porous cloth 128 oriented in a planar parallel relationship to the major surface of the workpiece, an eductor 116, and a solution flow dampening member 136 that includes a flow-directing surface and an electrolyte solution containing metal ions. A copy of Figure 11 is attached along with a perspective view of the anode chamber showing the porous cloth and several anode bags housing the anode material suspended in the chamber.

In the Office Action of April 2, 2008 the pending claims are rejected as obvious over van Kempen et al. (U.S. Patent 6,818,115) in view of the admitted prior art and Botts et al. (U.S. Patent 5,776,327), and in further view of Gagnon et al. (U.S. Patent 5,616,246). Prior to receiving this Office Action, Claim 21 had been amended to recite that the anode "is housed in an anode chamber that includes a porous cloth oriented in a planar parallel relationship to the major surface of the workpiece."

The Office Action acknowledges that van Kempen et al. does not teach an anode chamber that includes a porous cloth in a planar parallel relationship to the major surface of the workpiece, as recited in amended Claim 21. Gagnon et al. is cited as disclosing an anode bag made from cotton cloth and concludes that it would have been obvious to provide an anode bag in the claimed anode chamber. An anode bag is a small tubular cloth bag containing anode material. The cloth anode bag shown in the Gagnon reference does not correspond to the claimed porous cloth that is in a planar parallel relationship to the major surface of the workpiece. A person of skill in the art reading Claim 21 and Gagnon et al. would recognize that a porous anode bag does not extend parallel to the workpiece as claimed.

The Applicants have found that the use of the porous cloth running parallel to the workpiece improves (i.e., decreases) the variability coefficient (CoV).

In the application, Test 5 (Table 1) was conducted using an electrolytic cell that included the anode chamber, a porous cloth in a planar parallel relationship to the major surface of the 450 mm x 600 mm workpiece, and a 152 mm non-conducting shield. Test 5 was run at high flow, 26 cycles/min oscillation, and 1400 cycles/min vibration with a distance of 213 mm between the anode and the workpiece. The CoV for Test 5 was 7.72%. Test 5F (Table 2) was run at the same parameters as Test 5 in an analogous cell, except that the porous cloth was removed from the anode chamber. The CoV value increased to 11.61%, which "shows that removing the porous fiber cloth from the anode chamber decreased the uniformity (increased the CoV) of the metal deposition." See paragraph [0106].

The pending application also states in paragraph [0106]:

> In summary, the best result was achieved in Test 5DH, which ran at high flow, 26 cycles/min oscillation, 1400 cycles/min vibration, 213 mm distance between anode (112) and steel panel workpiece (102), used an anode chamber (126) with a porous fiber cloth (128), had 191 mm non-conducting shield (130), on top of the anode chamber (126), and had a baffle (138) attached below both anode chambers (126).

(Emphasis Added).

To further demonstrate the effect of the porous cloth, I conducted additional tests under the conditions of Test 5DH. I used a cell analogous to the cell shown in Fig. 11, except that the baffles (138) were not present. For test 5DH-I, the anode chamber (126) was removed and a 450 mm x 600 mm stainless steel panel was plated at 25 Amps/Square foot for 48 minutes. The resulting foils were measured for thickness distribution to determine the CoV as explained in the application. Test 5DH-I was run at the low flow condition, i.e., with the electrolyte pump running at the "low" setting, because the flow was quite vigorous without the anode chamber present.

For the remainder of the tests, the anode chamber (126) including its non-conducting shielding (130) was placed in the cell. For tests 5DH-II and 5DH-III the porous fiber cloth was omitted. A 450 mm x 600 mm stainless steel panel was plated at 25 Amps/Square foot for 48 minutes. The resulting panel was measured for thickness distribution to determine CoV.

For tests 5DH-IV and 5DH-V, the porous fiber cloth (128) was reinstalled in the anode chamber (126). Again a 450 mm x 600 mm stainless steel panel was plated at 25 Amps/Square foot for 48 minutes. CoV was measured.

The CoV data for both the front and back sides of the workpiece for each of the five additional tests is provided in Table 1 below.

Table I

Test	Anode Description	Flow	CoV (%) Front	CoV (%) Back
5DH - I	No Chamber (No Cloth or Shields)	Low	17.2	14.4
5DH - II	Chamber with 191 mm Shields without cloth	High	10.1	9.2
5DH - III	Chamber with 191 mm Shields without cloth	Low	10.4	7.1
5DH - IV	Chamber with 191 mm Shields & a Cloth	High	7.5	5.3
5DH - V	Chamber with 191 mm Shields & a Cloth	Low	11.9	8.3

A comparison of the results of tests 5DH-II and 5DH-IV show that the porous cloth greatly improved the coefficient of variation for the workpiece. Whereas Test 5DH-II in which the chamber did not include the porous cloth provided a coefficient of variation of 9.2% for the back and 10.1% for the front of the workpiece, Test 5DH-IV that included the porous cloth had a greatly improved variability coefficient of 7.5% for the front and 5.3% for the back.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed by: Holly Garich on: 9-18-08

Holly Garich
Project Engineer
Faraday Technology, Inc.

ATTACHMENT TO DECLARATION OF HOLLY GARICH

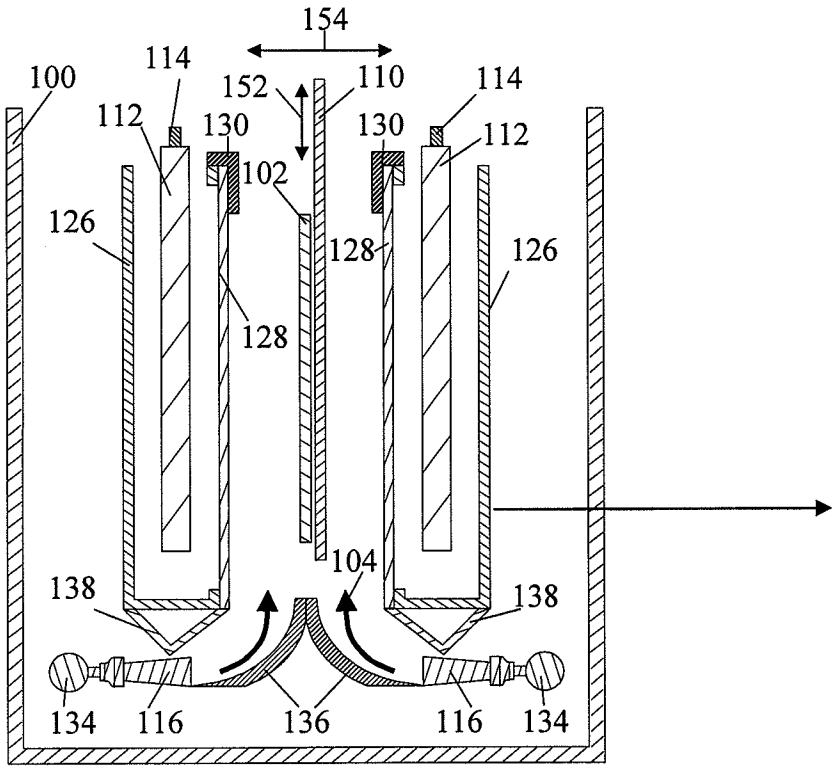

FIG. 11

ATTACHMENT TO DECLARATION OF HOLLY GARICH